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FOCUS ON CORONARY PHYSIOLOGY

Influence of Local Myocardial Damage on Index of Microcirculatory Resistance and Fractional Flow Reserve in Target and Nontarget Vascular Territories in a Porcine Microvascular Injury Model

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Joo Myung Lee, Hyun Kuk Kim, Kyung Seob Lim, Jun-Kyu Park, Ki Hong Choi, Jonghane Park, Doyeon Hwang, Tae-Min Rhee, Jeong Hoon Yang, Eun-Seok Shin, Chang-Wook Nam, Joon-Hyung Doh, Joo-Yong Hahn, Bon-Kwon Koo, Myung Ho Jeong

In this investigation, the authors explored the influence of microvascular damage in the left anterior descending coronary artery (LAD) on the physiological parameters of a remote vessel using a porcine microvascular damage model. With selective injection of microspheres into the LAD, both the index of microcirculatory resistance (IMR) and fractional flow reserve (FFR) were significantly increased in the LAD. However, the left circumflex coronary artery did not show any change in FFR and IMR values, despite the significant microvascular damage in the LAD. These results support the use of FFR-guided strategy for nonculprit vessels in patients with acute myocardial infarction.



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■ EDITORIAL COMMENT

Fractional Flow Reserve in Nonculprit Vessel During ST-Segment Elevation Myocardial Infarction: Reliable or Prone to Error?

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Marc D. Feldman, Amit K. Gupta

Diagnostic and Prognostic Efficacy of Coronary Flow Capacity Obtained Using Pressure-Temperature Sensor-Tipped Wire-Derived Physiological Indices

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Rikuta Hamaya, Taishi Yonetsu, Yoshihisa Kanaji, Eisuke Usui, Masahiro Hoshino, Masao Yamaguchi, Masahiro Hada, Yoshinori Kanno, Tadashi Murai, Kenzo Hirao, Tsunekazu Kakuta

Coronary flow capacity (CFC) provides an integrated coronary physiological assessment in which coronary flow reserve and coronary flow velocity during hyperemia are organized. The study demonstrated a categorization using pressure-temperature sensor-tipped wire-derived CFC (PTW-CFC), which provided stratification of physiological indices. PTW-CFC categorization was associated with major adverse cardiac events (MACE) independently from fractional flow reserve. In percutaneous coronary intervention (PCI) severely reduced PTW-CFC, MACE incidence was rare in patients with post-PCI normal PTW-CFC. PTW-CFC mapping is feasible and provides accurate stratifications of coronary flow impairment and prognosis.



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■ EDITORIAL COMMENT

Coronary Flow Measurements in Clinical Practice: The Waves Are There, The Wind Is Calling

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Tim P. van de Hoef, Jan J. Piek



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Influence of Microcirculatory Dysfunction on Angiography-Based Functional Assessment of Coronary Stenoses

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Hernán Mejía-Rentería, Joo Myung Lee, Francesco Lauri, Nina W. van der Hoeven, Guus A. de Waard, Fernando Macaya, María José Pérez-Vizcayno, Nieves Gonzalo, Pilar Jiménez-Quevedo, Luis Nombela-Franco, Pablo Salinas, Iván Núñez-Gil, María del Trigo, Sonoka Goto, Hyun Jong Lee, Catherine Liontoux, Antonio Fernández-Ortiz, Carlos Macaya, Niels van Royen, Bon-Kwon Koo, Javier Escaned

The current study evaluated the influence of coronary microcirculatory dysfunction (CMD) on diagnostic performance of the quantitative flow ratio (QFR) using fractional flow reserve (FFR) as a reference. In the overall cohort, classification agreement (CA) between QFR and FFR and the diagnostic efficiency of QFR were high (CA: 88%, area under the receiver-operating characteristic curve [AUC]: 0.93). In patients with CMD, which was defined as high index of microcirculatory resistance (IMR) (≥ 23 U), CA (76% vs. 92%; $p < 0.001$), and diagnostic efficiency (AUC: 0.88 vs. 0.96; $p < 0.001$) was significantly lower than patients with low IMR. Nevertheless, the diagnostic efficiency of percent diameter stenosis (%DS) in assessing the functional significance remained inferior to QFR even in patients with CMD (AUC of %DS 0.72 vs. AUC of QFR 0.88; $p < 0.001$). In conclusion, CMD decreases the diagnostic performance of QFR. However, even in the presence of CMD, QFR remains superior to angiographic assessment in ascertaining functional stenosis severity, as judged by FFR.

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■ EDITORIAL COMMENT

A Song of Pressure and Flow, or There and Back Again

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James P. Howard, Venkatesh L. Murthy

Pre-Angioplasty Instantaneous Wave-Free Ratio Pullback Predicts Hemodynamic Outcome in Humans With Coronary Artery Disease: Primary Results of the International Multicenter iFR GRADIENT Registry

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Yuetsu Kikuta, Christopher M. Cook, Andrew S.P. Sharp, Pablo Salinas, Yoshiaki Kawase, Yasutsugu Shiono, Alessandra Giavarini, Masafumi Nakayama, Salvatore De Rosa, Sayan Sen, Sukhjinder S. Nijjer, Rasha Al-Lamee, Ricardo Petraco, Iqbal S. Malik, Ghada W. Mikhail, Raffi R. Kaprielian, Gilbert W.M. Wijntjens, Shinsuke Mori, Arata Hagikura, Martin Mates, Atsushi Mizuno, Farrel Hellig, Kelvin Lee, Luc Janssens, Kazunori Horie, Shah Mohd Nazri, Raul Herrera, Florian Krackhardt, Masahiro Yamawaki, John Davies, Hideo Takebayashi, Thomas Keeble, Seiichi Haruta, Flavio Ribichini, Ciro Indolfi, Jamil Mayet, Darrel P. Francis, Jan J. Piek, Carlo Di Mario, Javier Escaned, Hitoshi Matsuo, Justin E. Davies

This study aimed to evaluate the accuracy of online instantaneous wave-Free Ratio (iFR) pullback measurements to predict physiological outcome post-percutaneous coronary intervention (PCI), and to characterize how the availability of iFR pullback data altered PCI strategy compared with angiography alone. The findings of this first-in-man prospective registry demonstrated that online analysis of iFR pullback data predicted the physiological outcome of PCI with a high degree of accuracy in tandem/diffuse coronary disease. Compared with angiography alone, iFR pullback data altered revascularization procedural planning in nearly one-third of patients.

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■ EDITORIAL COMMENT

Instantaneous Wave-Free Ratio Pressure Pullback With Virtual Percutaneous Coronary Intervention Planning: Seeing the Future of Coronary Interventions?

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Morton J. Kern, Arnold H. Seto

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